

I claim:

1. Aluminum-free borosilicate glass with chemical resistance and having a composition, in percent by weight, based on oxide content, of:

| | |
|-------------------------------|----------|
| SiO ₂ | 60 - 78 |
| B ₂ O ₃ | 7 - 20 |
| Li ₂ O | 0 - 2 |
| Na ₂ O | 0 - 4 |
| K ₂ O | 3 - 12 |
| MgO | 0 - 2 |
| CaO | 0 - 2 |
| with MgO + CaO | 0 - 3 |
| BaO | 0 - 3 |
| ZnO | 0 - 2 |
| ZrO ₂ | 0.8 - 12 |
| TiO ₂ | 0 - 10 |
| CeO ₂ | 0 - 1 |
| F ⁻ | 0 - 0.6 |

and optionally at least one refining agent in a standard amount for refining.

2. Aluminum-free borosilicate glass as defined in claim 1, characterized by a composition, in percent by weight, based on oxide content, of:

| | |
|---|------------|
| SiO ₂ | 67 - 75 |
| B ₂ O ₃ | 9 - 18 |
| Li ₂ O | 0 - 1 |
| Na ₂ O | 0 - 3 |
| K ₂ O | 5 - 10 |
| with Li ₂ O + Na ₂ O + K ₂ O | 5.5 - 13.5 |
| CaO | 0 - 1 |
| BaO | 0 - 1 |
| ZnO | 0 - 1 |
| TiO ₂ | 0 - 1 |
| ZrO ₂ | 0.8 - 10.5 |
| CeO ₂ | 0 - 0.4 |
| F ⁻ | 0 - 0.6 |

and optionally at least one refining agent in a standard amount for refining.

3. Aluminum-free borosilicate glass as defined in claim 1, characterized by a composition, in percent by weight, based on oxide content, of:

| | |
|-------------------------------|---------|
| SiO ₂ | 68 - 74 |
| B ₂ O ₃ | 9 - 13 |
| Li ₂ O | 0 - 1 |

| | |
|---|------------|
| Na ₂ O | 0 - 3 |
| K ₂ O | 5 - 10 |
| with Li ₂ O + Na ₂ O + K ₂ O | 5.5 - 13.5 |
| ZrO ₂ | 3 - 7 |
| CeO ₂ | 0 - 0.4 |
| F ⁻ | 0 - 0.6 |

and optionally at least one refining agent in a standard amount for refining.

4. Aluminum-free borosilicate glass as defined in claim 1, characterized by a composition, in percent by weight, based on oxide content, of:

| | |
|---|----------|
| SiO ₂ | 71 - 74 |
| B ₂ O ₃ | 9 - 12 |
| Li ₂ O | 0 - 1 |
| Na ₂ O | 0 - 3 |
| K ₂ O | 7 - 10 |
| with Li ₂ O + Na ₂ O + K ₂ O | 7 - 13.5 |
| ZrO ₂ | 4 - 7, |

and optionally at least one refining agent in a standard amount for refining.

5. Aluminum-free borosilicate glass as defined in claim 1, characterized by a composition, in percent by weight, based on oxide content, of:

| | |
|-------------------------------|---------|
| SiO ₂ | 68 - 71 |
| B ₂ O ₃ | 8 - 11 |

| | |
|---|------------|
| Li ₂ O | 0 - 1 |
| Na ₂ O | 0 - 3 |
| K ₂ O | 8 - 11 |
| with Li ₂ O + Na ₂ O + K ₂ O | 8 - 13.5 |
| ZrO ₂ | 7.5 - 10.5 |

and optionally at least one refining agent in a standard amount for refining.

6. Aluminum-free borosilicate glass as defined in claim 1, characterized by a composition, in percent by weight, based on oxide content, of:

| | |
|---|------------|
| SiO ₂ | 70 - 75 |
| B ₂ O ₃ | 15 - 18 |
| Li ₂ O | 0 - 1 |
| Na ₂ O | 0 - 3 |
| K ₂ O | 5 - 8 |
| with Li ₂ O + Na ₂ O + K ₂ O | 5.5 - 10.5 |
| CaO | 0 - 1 |
| BaO | 0 - 1 |
| TiO ₂ | 0 - 1 |
| ZrO ₂ | 0.8 - 5 |

and optionally at least one refining agent in a standard amount for refining.

7. Aluminum-free borosilicate glass as defined in claim 1, characterized by a composition, in percent by weight, based on oxide content, of:

| | |
|---|----------|
| SiO ₂ | 67 - 70 |
| B ₂ O ₃ | 15 - 18 |
| Li ₂ O | 0 - 1 |
| Na ₂ O | 0 - 3 |
| K ₂ O | 7 - 10 |
| with Li ₂ O + Na ₂ O + K ₂ O | 7 - 12.5 |
| ZnO | 0 - 1 |
| ZrO ₂ | 2.5 - 6 |

and optionally at least one refining agent in a standard amount for refining.

8. Aluminum-free borosilicate glass as defined in claim 1, characterized by a composition, in percent by weight, based on oxide content, of:

| | |
|---|---------|
| SiO ₂ | 74 - 78 |
| B ₂ O ₃ | 12 - 15 |
| Li ₂ O | 0 - 1 |
| Na ₂ O | 0 - 3 |
| K ₂ O | 3 - 8 |
| with Li ₂ O + Na ₂ O + K ₂ O | 3 - 11 |
| ZnO | 0 - 1 |
| ZrO ₂ | 2.5 - 7 |

and optionally at least one refining agent in a standard amount for refining.

9. Aluminum-free borosilicate glass as defined in claim 1, and containing at least 0.2 percent by weight of said Li_2O .

10. Aluminum-free borosilicate glass as defined in claim 1, and containing at least 0.3 percent by weight of said Na_2O .

11. Aluminum-free borosilicate glass as defined in claim 1, and containing at least 0.5 percent by weight of said Na_2O .

12. Aluminum-free borosilicate glass as defined in claim 1, and containing at least 0.2 percent by weight of said Li_2O and at least 0.3 percent by weight of said Na_2O .

13. Aluminum-free borosilicate glass as defined in claim 1, free of As_2O_3 and Sb_2O_3 apart from inevitable impurities thereof.

14. Aluminum-free borosilicate glass as defined in claim 1, having a coefficient of thermal expansion α (20°C ; 300°C) of between $3.0 \times 10^{-6} / \text{K}$ and $6 \times 10^{-6} / \text{K}$ and a working point V_A of between 990°C and 1290°C .

15. A primary pharmaceutical packaging material consisting of the aluminum-free borosilicate glass as defined in claim 1.

16. A glass fiber comprising the aluminum-free borosilicate glass as defined in claim 1.

17. The glass fiber as defined in claim 16, and having a composition and properties for reinforcing concrete.

18. A sealing glass for tungsten, molybdenum or KOVAR® consisting of the aluminum-free borosilicate glass as defined in claim 1.

19. A fluorescent lamp made with the aluminum-free borosilicate glass as defined in claim 1.

20. The fluorescent lamp as defined in claim 19 and consisting of a miniaturized fluorescent lamps.

21. An apparatus glass consisting of the aluminum-free borosilicate glass as defined in claim 1.